

Passive Wireless SAW Humidity Sensors and System, Phase II

Completed Technology Project (2009 - 2011)



Project Introduction

Phase I demonstrated the technical feasibility of creating surface acoustic wave (SAW) based humidity sensors that respond rapidly (under 0.5 second) and reversibly to a wide range of humidity levels using nanoparticle and thin polymer films. This proposal describes a Phase II effort that will result in the development of multiple uniquely identifiable, wirelessly interrogable, passive humidity sensors, and a wireless interrogation system to obtain and interpret the sensor responses. The interrogation system used will be a slightly modified version of the system designed by ASR&D for use in the wireless SAW concrete maturity monitoring system currently being developed by ASR&D under funding from the Maryland Technology Development Corporation (TEDCO) and under the NASA Phase II STTR contract NNN07EA38C. ASR&D thinks that this interrogation system, which incorporates coded sensor time diversity with self-synchronization, has significant advantages over the OFC-sensor-based systems previously developed by the ASR&D and the University of Central Florida in terms of increased range and the larger number of sensors that can simultaneously operate without sensor to sensor interference. The proposed Phase II effort has technical objectives that aim (i) to further the development and implementation of the passive wireless SAW humidity sensor technology for which preliminary technical feasibility was demonstrated in Phase I, (ii) to modify existing breadboard wireless interrogator electronics to operate with these sensors, and (iii) to produce prototype sensor devices capable of operation with the modified breadboard wireless interrogator system to produce a multiple sensor system usable for field demonstration of the technology. Wireless system demonstrations will be conducted using laboratory samples of the composites used in wind turbines or other NASA relevant applications. At the completion of the Phase II effort, the sensors and system will be at TRL 4-5.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

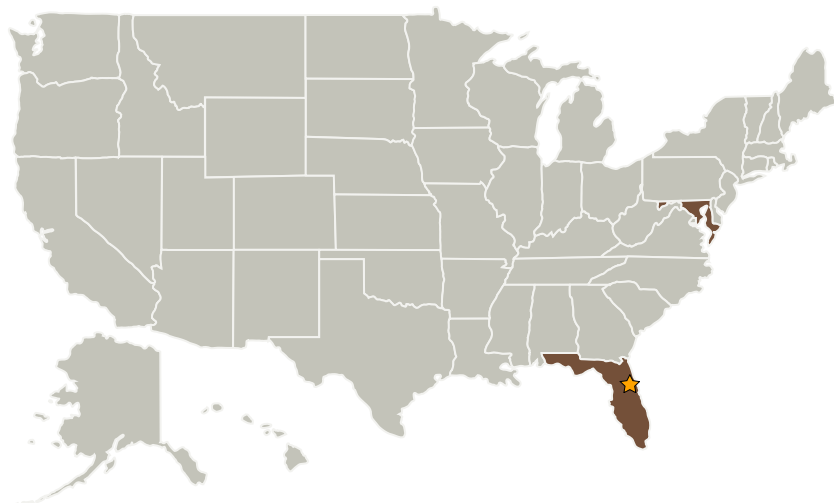
Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
SenSanna Incorporated (formerly Applied Sensor Research & Development)	Supporting Organization	Industry Women-Owned Small Business (WOSB), Veteran-Owned Small Business (VOSB)	Arnold, Maryland

Primary U.S. Work Locations

Florida	Maryland
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Project Transitions

 **September 2009:** Project Start

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
 - └ TX13.2 Test and Qualification
 - └ TX13.2.7 Test Instruments and Sensors

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 **November 2011:** Closed out